SANTA CRUZ SMALL CRAFT HARBOR

Managing a harbor at the intersection of the Arana watershed and the Pacific Ocean

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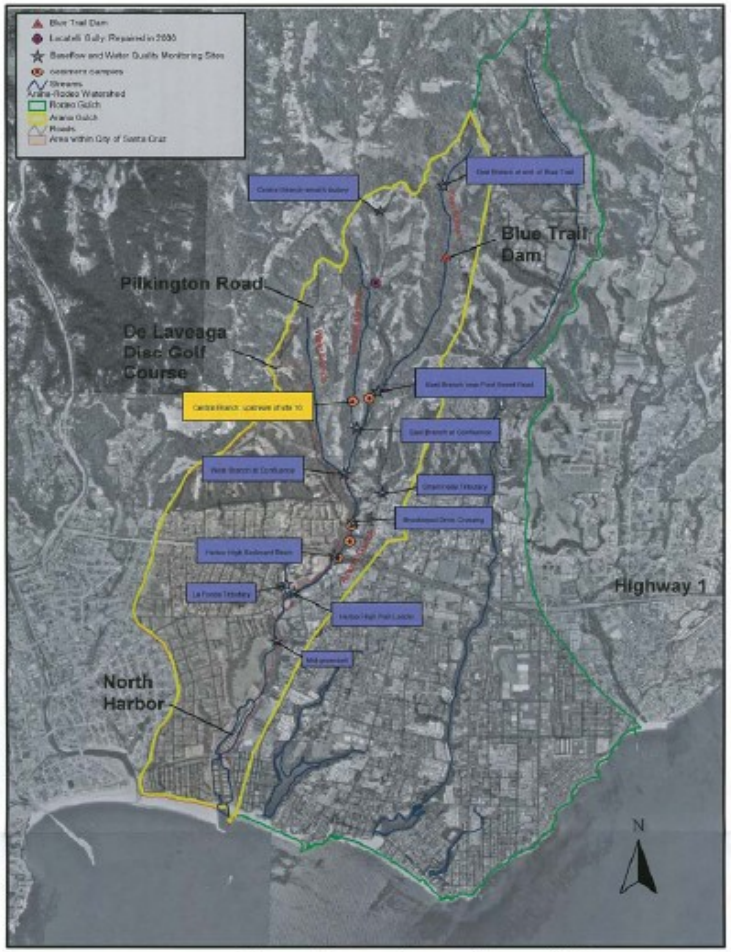
Arana Gulch Watershed

3 square miles; 600 ft elevation.

Steep and erosional with many micro-climates

FIGURE 5: Arana Gulch Watershed



Balance Hydrologics, Inc.

Figure 3.1: Basemap of Arana Gulch. Major tributaries in the upper watershed are noted as well as the location of the Santa Cruz Harbor, historic water quality and base flow monitoring sites, channel bed and bank composition sampling sites and other key locations in the watershed.

Benthic Habitat

The nearshore

- *Sandy beaches*
- *Submerged sand zones*
- *Rocky outcroppings*
- *Expansive Giant Kelp fields*

FIGURE 6: Benthic Habitat Before Dredging

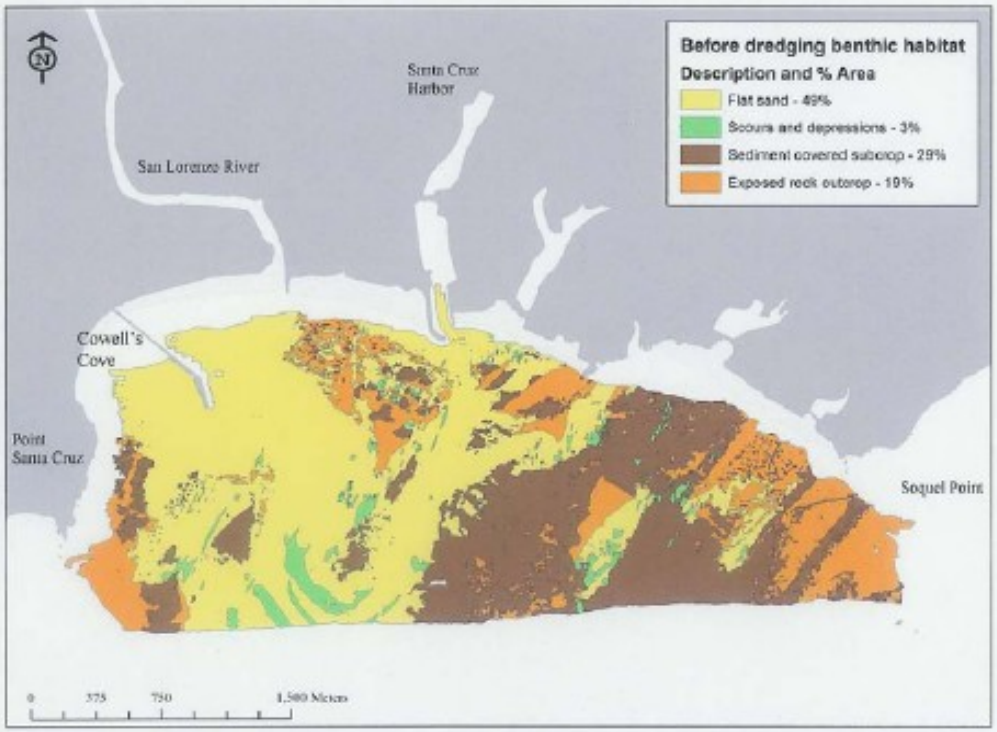


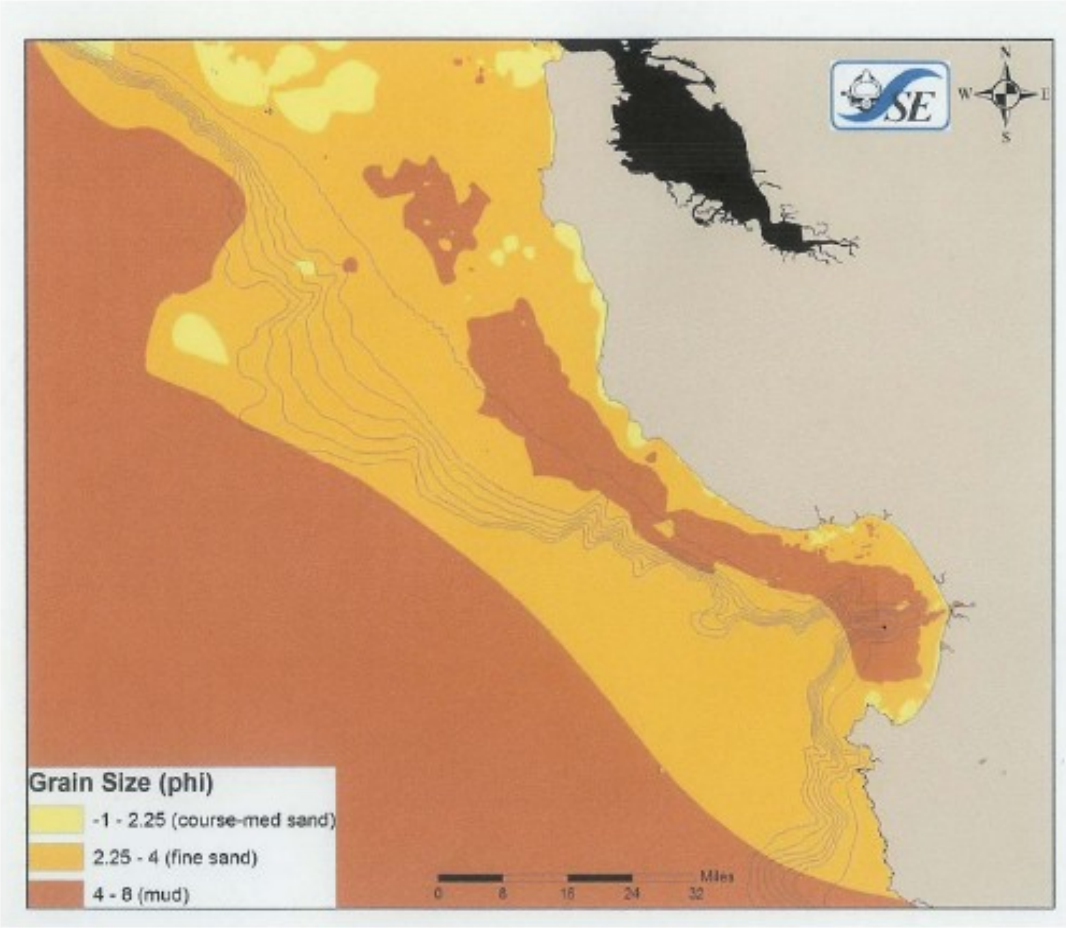
Figure 30. This benthic habitat map was produced in GIS by visually interpreting multibeam bathymetry and backscatter imagery collected before dredging took place offshore of SCH (see Figures 27, 28, and 29). The interpreted habitats were verified using offshore sediment samples (section 3.2) and SCUBA diver observations (section 3.3).

Monterey Bay Mid-shelf Mudbelt

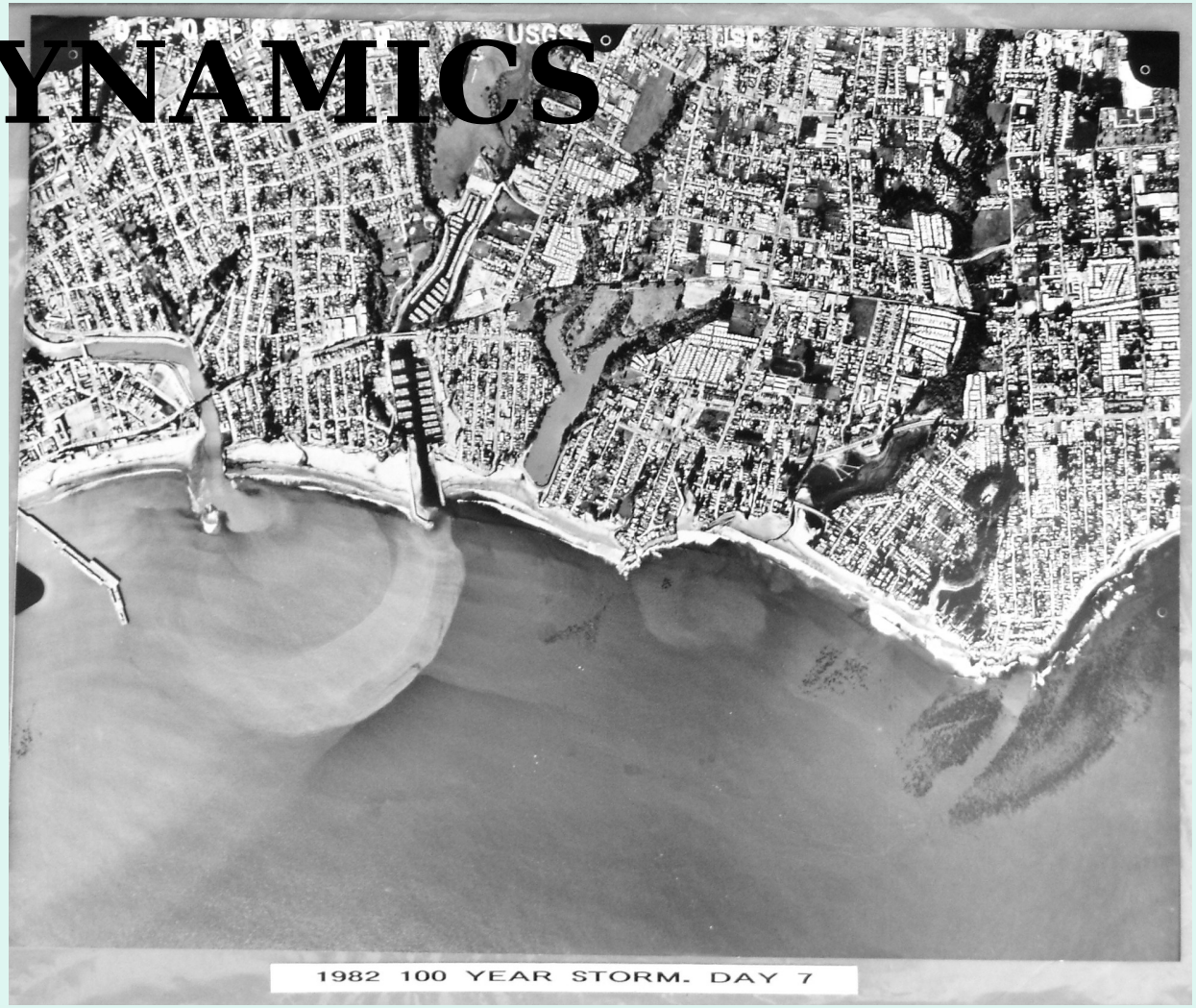
3 billion cubic yards of mud.

Extremely rich benthos.

FIGURE 8: Offshore Mud Shelf



SEDIMENT DYNAMICS



San Lorenzo River, 1982.
Flood – Day #7 (dredging without a permit)

The storms of 2005-06.
Boats aground from massive sediment run-off from Arana watershed

Shoaled harbor requires disposal of 20,000 CY

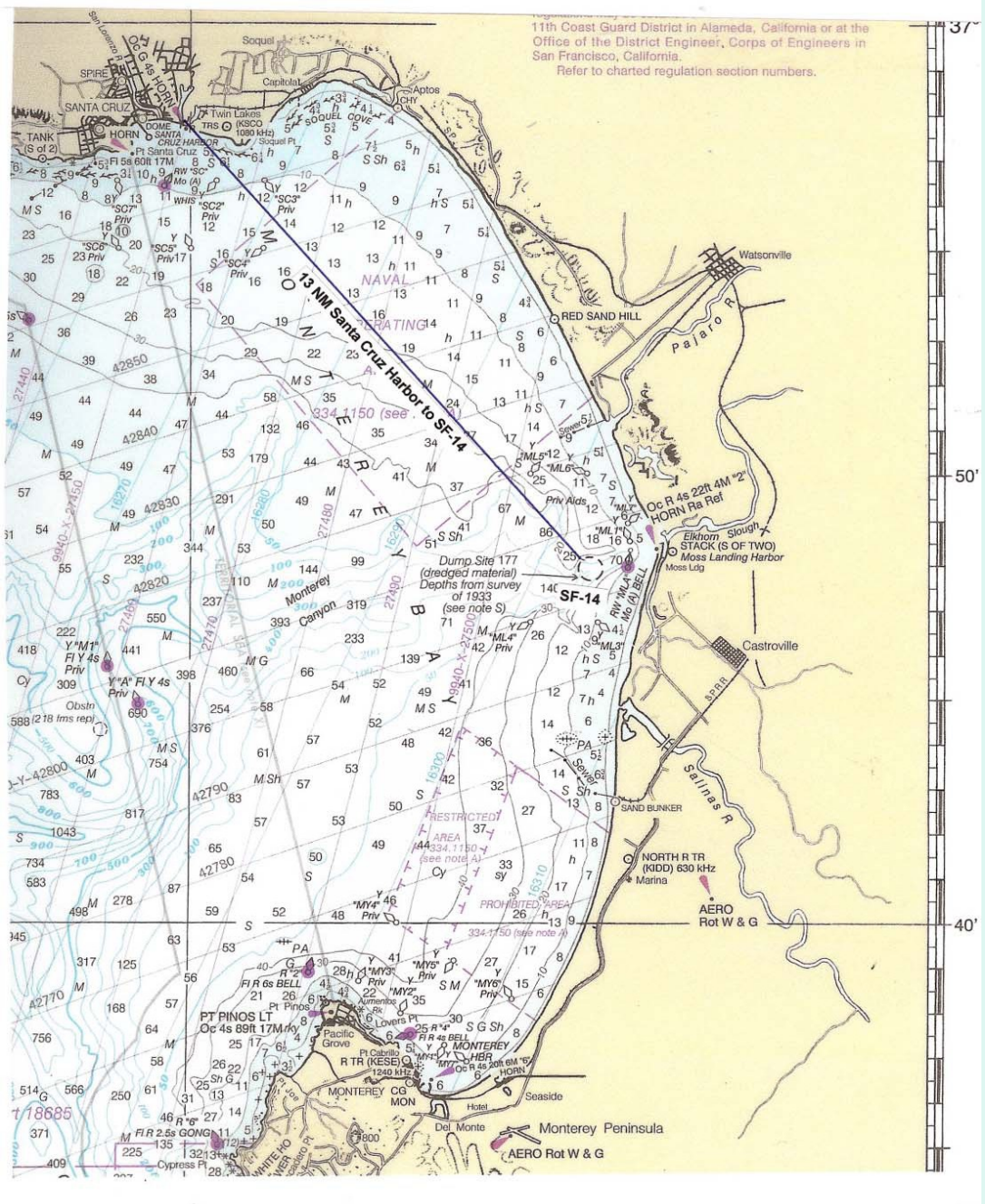
Disposal options:

- *Upland*
- *Offshore at SF-14*
- *Nearshore*

SF-14 Off-shore Disposal

System:

- *Dredge hydraulic or clamshell*
- *To barge*
- *Dry & dewater*
- *Tow barge to SF-14*
- *1,000 ft water at head of canyon*
- *Beneficial re-use – NONE*


11th Coast Guard District in Alameda, California or at the Office of the District Engineer, Corps of Engineers in San Francisco, California.
Refer to charted regulation section numbers.
13 NM Santa Cruz Harbor to SF-14
SF-14
Dump Site 177 (dredged material) Depths from survey of 1933 (see note S)
Monterey Canyon
RESTRICTED AREA
PROHIBITED AREA
NAVAL OPERATING AREA
Watsonville
RED SAND HILL
Castroville
SAND BUNKER
Marina
Seaside
Monterey Peninsula
Del Monte
MONTEREY
PT PINOS LT
Pacific Grove
Santa Cruz
Capitola
Aptos
Soquel
Twin Lakes
Pajaro R
Salinas R
Elkhorn Slough
Moss Landing Harbor
AERO Rot W & G
NORTH R TR (KIDD) 630 kHz
Oc R 4s 22ft 4M "2" HORN Ra Ref
Fl R 6s BELL
Fl R 2.5s GONG
Fl Y 4s
Oc 4s HORN
Fl 5s 60ft 17M
Oc 4s 89ft 17M
Priv Aids
Obstn
MONTEREY CG MON
Hotel
Cypress Pt
Loveria Pt
Pt Pinos
Pt Cabrillo
R TR (KESE) 1240 kHz
Oc R 4s 20ft 6M "5" HORN
Fl R 4s BELL
Fl Y 4s Priv
Y "M1" Fl Y 4s Priv
Y "A" Fl Y 4s Priv
"MY4" Priv
"MY5" Priv
"MY6" Priv
"MY2" Priv
"MY3" Priv
"ML3" Priv
"ML4" Priv
"ML5" Priv
"ML6" Priv
"ML1" Priv
"SC1" Priv
"SC2" Priv
"SC3" Priv
"SC4" Priv
"SC5" Priv
"SC6" Priv
"SC7" Priv
"SC8" Priv
RW "SC" Mo (A)
RW "ML4" Mo (A) BELL
Sewer
Sewer 2
Sewer 6
Sewer 7
Sewer 8
Sewer 9
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Sewer 23
Sewer 24
Sewer 25
Sewer

Grain Size Average

50% sand
50% silt / clay

Hydraulic dredge "Squirt"

Dredge dewatering operation – truck to landfill

Upland Disposal

Positive Aspects – Sediment can be re-used:

- *Daily cover at landfill;*
- *Upland habitat restoration projects*

Upland Disposal Negative Aspects:

- 10,000 CY sand lost to beach
- 10,000 CY silts & clays loss to mudbelt
- Cost is $94 per yard delivered to landfill
- 1,000 truck trips on Highway One
- Heavy carbon footprint

Demonstration Dredging Projects in March 2001 and October 2005

- *The two projects averaged 37% sand content. The average daily rate of disposal was 550 CY of fine-grained (<63 microns). Findings:*

Sand Fractions:

- *Replenished the beach.*

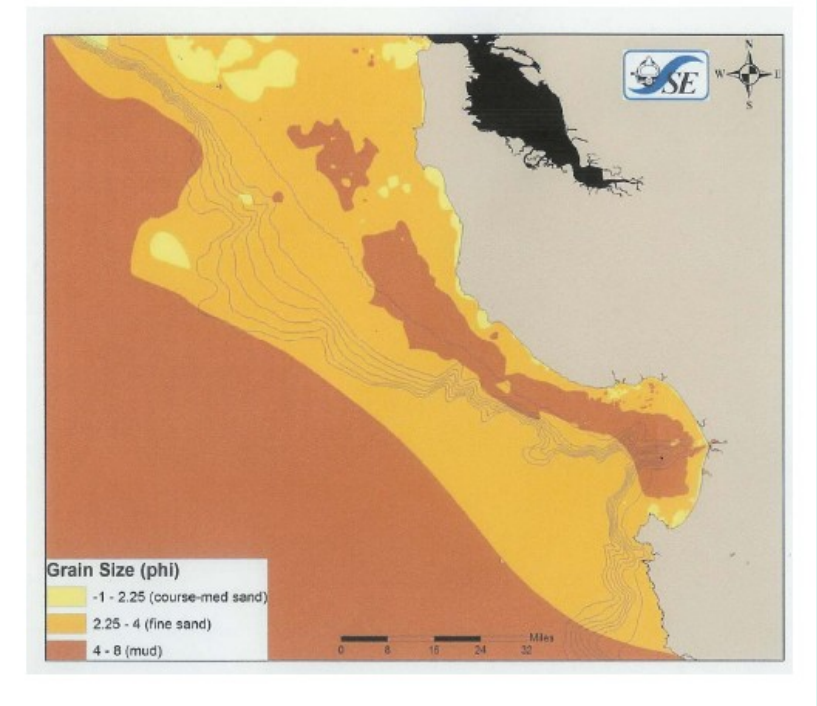
Mud Fractions:

- *Did not stay in or smother nearshore benthos;*
- *Replenished mid-shelf mudbelt as a final destination*

Conclusions

- **#1 Watersheds**
  - *Should have a Coordinated Resource Management Plan "CRMP," to prevent erosion and restore habitats*

- **#2 Nearshore Dredge Disposal**
  - *The offshore destinations of any sediment placement should be identified*



- **#3 Dredging of Harbor**
  - *Nearshore disposal of mixed grained (30%-79% sand) should be allowed when it can be demonstrated that the ocean energy delivers all grain fractions to compatible destinations without harm to intervening habitats during transit*

- **Suggested Criteria for Analyzing Nearshore Placement of Mixed Grained Sediment**
  - *Appropriate rate of fine-grained disposal (Santa Cruz Harbor = 550 CY/day <63u)*
  - *Appropriate time of year in regard to wave and current energy (Santa Cruz Harbor = October to April)*
  - *The sediment placement outcome can be clearly predicted and demonstrated*
  - *Sediment is suitable for unconfined aquatic disposal*
  - *Human contact is avoided*
  - *Recreational value of beach is not compromised (or can be mitigated)*

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